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AGRICULTURAL LIME ANALYSES

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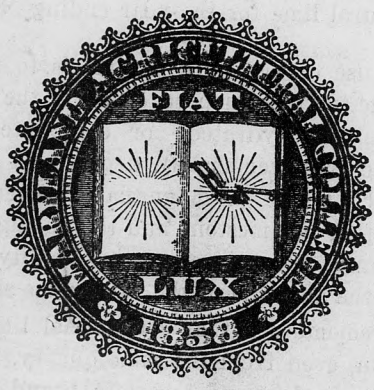

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Chemical Department, Maryland State College of Agriculture

COLLEGE PARK, MD.

ANALYSES OF

Agricultural Lime Sold in Maryland

BY THE DIVISION OF GENERAL SCIENCE

The Maryland State College of Agriculture

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The tables on the following pages contain the results of the analysis of agricultural lime for the year ending November, 1918.

The principal use of agricultural lime is to neutralize acid in the soil and its value for this purpose, either in the commercial oxide, or burnt lime, slaked (hydrated) or carbonate of lime (either as ground limestone or oyster shells), depends on the amount of oxide of lime present. Oxide of magnesia is generally present to a greater or lesser extent in limestone and this is slightly more efficient than an equal amount of lime in correcting acidity, so that, for comparative purposes, the amounts of the two oxides should be added.

It should be remembered that commercial lime will vary somewhat in composition, even from the same quarry, from time to time, so that a few points in favor of a certain brand as against another brand, may mean nothing, as the figures may be reversed in the next analysis.

All the forms of lime mentioned are good and the form to use depends on local conditions—the kinds available, the comparative prices, cost of freight, distance of haul, ease and cheapness of application, etc.

All forms are best applied on top of plowed ground and harrowed in. Quick lime, hydrated lime and gas lime should be applied

some time before sowing the crop. Quick lime soon takes up water and slakes when spread out and then takes up carbonic acid gas and is converted to the carbonate, similar, chemically, to the original limestone, but is finely subdivided.

The proper fineness when ground limestone is used is a point on which there are differences of opinion and, again, should depend somewhat on local conditions. All agree that the finer the grinding the quicker the action and the sooner the lime will be used up. Where a coarser product is much cheaper and the freight and hauling comparatively small, the coarses product may be used to advantage, using more of it to the acre and applying less frequently.

In most cases it is desirable that ground limestone, shells, etc., be so fine that the greater part will pass a 60-mesh sieve. In this case much of it will be finer than 60-mesh. That coarser than 20-mesh is very slowly available and much less valuable. The fineness is determined by using sieves with different sizes of wire. "60-mesh" is a sieve made of wire cloth with 60 wires to the linear inch in both directions.

It will be noted that in case of the quicklimes in the table that the sum of the oxides of lime and magnesia and the insoluble matter will fall short of 100 per cent. The difference is made up of carbon dioxide gas, oxides of iron and alumina, water, etc. In practice the carbon dioxide is never completely driven out of lime in burning; frequently from 2 to 5 per cent, and even more, will remain in the quick lime. The latter also slowly takes up this gas, as well as water, from the air on standing.

Lime, in connection with clover, or other legumes, will, to a large extent, take the place of the expensive nitrogen (ammonia) of commercial fertilizers, but will not greatly relieve the necessity for phosphates and potash.

Lime should be handled, when possible, in carload lots, to avoid unnecessary expense. Where one farmer does not need so much at one time he should be able to arrange with one or more neighbors to get a full car.

A ton of quick lime or two tons of ground stone or shells is a very common amount to apply per acre.

The comparative values of different limes depend, largely, on the respective amounts of actual Lime (Calcium Oxide) present, to which should be added the Magnesia. Insoluble matter, water, carbon dioxide, etc., may be classed as fillers.

ANALYSES OF LIME.

No.	Name of Manufacturer or Agent.	Name of Lime	Place of Sampling.	Calcium Oxide CaO		Magnesium Oxide MgO		Sand & Insoluble (of no value)	
				FOUND.	Guaranteed.	FOUND.	Guaranteed.	FOUND.	Guaranteed.
1019	Acme Lime Co., Balto., Md.	†Hydrated Lime.....	Baltimore.....	52.60	50.00	.79		5.00	
578	Frank Adams, Hagerstown, Md.	Lime Marl.....	Hagerstown...	44.40	50.00	.45		8.56	
1021	S. W. Barrick & Sons, Woodsboro, Md.	Agr'l Lump Lime.....	Woodsboro....	84.55	85.00	3.80		3.15	
561	" " " "	Ground Lime.....	Woodsboro....	65.82	85.00	8.36		7.04	
562	" " " "	Hydrated Lime.....	Woodsboro....	56.50	56.00	3.08		8.08	
579	Beaver Dam Marble Co., Cockeysville, Md.	*Agr'l Limestone.....	Cockeysville...	30.24	50.00	18.55		1.12	
580	Blair Limestone Co., Martinsburg, W. Va.	Hydrated Lime.....	Bel Air.....	66.42	65.00	1.25		4.22	
1004	" " " "	Shenandoah Gr. Lime..	Martinsburg, W. Va.	47.70	48.00	30.60		6.36	
1003	H. Bryant's Son, Alexandria, Va.	*Ground Oyster Shells..	Alexandria, Va.	45.80	45.00	.46		12.04	
581	J. E. Buffington, Union Bridge, Md.	Agr'l Lump Lime	Union Bridge..	90.04	90.00	1.23		.76	
582	James Bushey & Son, Cavetown, Md.	Agr'l Lump Lime.....	Cavetown	73.92	70.00	17.18		1.76	
1008	Carbo Agricultural Lime Co., Wilmington, Del.	Carbo-Lime	Wilmington, Del...	37.82	40.00	2.72		.16	

583	Chesapeake Shell & Lime Co., Crisfield, Md.	*Ground Oyster Shells..	Crisfield.....	51.74	50.00	.35		1.98
555	Crisfield Shell Lime Co., Inc., Crlsfield, Md.	Hyd. Oyster Shell Lime	Crisfield.....	61.03	60.00	.44		7.65
598	Emig Lime Co., Hellam, Pa.	Agr'l Lump Lime	Hellam, Pa....	87.22	97.53	1.54		.68
584	Daniel Feeney, Texas, Md.	Agr'l Lump Lime	Texas.....	79.52	70.00	2.30		10.28
563	Fountain Rock Lime Co., Woodsboro, Md.	Agr'l Lump Lime	Fountain Rock	64.95	85.00	14.99		5.16
564	" " " "	Ground Lime.....	Fountain Rock	71.45	85.00	3.42		6.00
565	" " " "	Hydrated Lime.....	Fountain Rock	61.15	50.00	1.10		5.64
566	M. J. Grove Lime Co., Lime Kiln, Md.	Agr'l Lump Lime	Frederick	66 50	85.00	14.43		12.04
567	" " " "	Ground Lime.....	Frederick.....	63.07	85.00	9.17		12.70
568	" " " "	Hydrated Lime.....	Frederick	56.66	65.00	5.32		13.06
559	Robert Green, Balto., Md.	Oyster Shell Lime.....	Colora.....	71.45	70.00	.84		8.28
585	John S. Hyde, Westminster, Md.	Agr'l Lump Lime	Westminster ..	73.02	85.00	9.12		6.12
586	A. M. Isanogle, Thurmont, Md.	Agr'l Lump Lime	Thurmont.....	57.16	60.00	21 24		5.84
587	D. C. Kemp Lime Co., Frederick, Md.	Agr'l Lump Lime	Frederick	66.53	75.00	7.54		9.04
588	" " "	Hydrated Lime.....	Frederick	58.91	60.00	11.90		9.86
595	Knickerbocker Lime Co., Phila., Pa.	Ground Fresh Lime....	Philadelphia...	79.07	50.00	12.62	33.00	2.24
596	" " " "	Hydrated Lime.....	Philadelphia...	75.16	45.00	8.86	30.00	1.36
1015	" " " "	Run of Kiln.....	Philadelphia...	49 06	50.00	28.11	33.00	2.36
569	Legore Combination Lime Co., Legore, Md.	Agr'l Lump Lime	Legore.....	81.12	85.00	2.70		5.36
570	" " " "	Hydrated Lime.....	Legore.....	56.45	50.00	1.65		11.36

†This is gas house lime, which is mostly carbonate of lime, with a small amount of hydrate of lime.
*Ground Shells or Stone Mechanical Analysis on page 8.

ANALYSES OF LIME.

No.	Name of Manufacturer or Agent.	Name of Lime	Place of Sampling.	Calcium Oxide CaO		Magnesium Oxide MgO		Sand & Insoluble (of no value)	
				Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.
589	W. P. Lindsay, Texas, Md.	Agr'l Lump Lime	Texas.....	85.34	85.00	.76		10.24	
571	McAleer Lime Co., Walkersville, Md.	Agr'l Lump Lime	Walkersville ..	77.80	90.00	3.02		6.52	
1018	Merion Lime & Stone Co., Norristown. Pa.	Hydrated Lime.....	Norristown.Pa.	48.10	45.00	27.25	30.00	1.44	
599	Natural Lime-Marl Co., Roanoke, Va.	*Lime-Marl	Roanoke, Va...	50.85	50.00	.74		3.56	
556	Orem & Winterbottom, Cambridge, Md.	Oyster Shell Lime.....	Cambri ge ..	76.05	80.00	.47		4.24	
1001	Palmer Lime & Cement Co., York, Pa.	Agricultural Lime	York, Pa.....	70.70	90 00	2.35	5 00	.40	
1002	" " " "	*Ground Limestone.....	York, Pa.....	49.28	48.00	4.95	5.00	.90	
590	" " " "	Hydrated Lime	Fallston.....	67.31	70.00	3.43		.92	
1007	Peerless Oyster Co., Balto., Md.	*Ground Oyster Shells..	Baltimore.....	49.28	50.00	.52		6.28	
591	Potomac Co., Harpers Ferry, W. Va.	Hydrated Lime.....	Silver Spring..	67.20	65.00	.74		5.60	
592	Salisbury Lime Co., Salisbury, Md.	Hydrated Oyster Shells	Salisbury.....	59.36	60.00	.23		6.68	
593	Chas. E. Staley, Frederick, Md.	Agr'l Lump Lime	Frederick.....	75.71	75.00	3.04		13.56	
1005	Security Cement & Lime Co., Hagerstown, Md.	Berkeley Ground Lime	Hagerstown...	82.08	90.00	2.49		1.12	

1005	Security Cement & Lime Co., Hagerstown, Md.	Berkeley Ground Lime	Hagerstown...	82.08	90.00	2.49		1.12
572	" " " "	*Ground Limestone.....	Silver Spring..	50.05	44.00	1.21		6.28
557	" " " "	Berkeley Hyd. Lime...	Colora.....	67.31	70.00	1.92		1.78
1006	" " " "	Berkeley Lump Lime..	Hagerstown...	92.29	80.00	.95		.32
573	Shank & Etzler, Frederick, Md.	Agr'l Lump Lime.....	Frederick	59.25	60.00	39.13		.02
574	" " " "	Hydrated Lime.....	Frederick	50.62	40.00	17.79		8.52
1009	Standard Lime & Stone Co., Buckeystown, Md.	Agr'l Lump Lime.....	Buckeystown..	94.08	90.00	.68		.61
1010	" " " "	Ground Lime.....	Buckeystown..	94.18	90.00	1 11		.60
1011	" " " "	Hydrated Lime.....	Buckeystown..	72.80	70.00	2.68		1.48
575	" " " "	*Pulverized Limestone..	Buck Lodge...	50.37	50.00	2.11		6.88
576	Steacy & Wilton Co., Wrightsville, Pa.	Sterling Hyd. Lime....	Taneytown....	66.53	65.00	2.82		3.51
1013	" " "	Run of Kiln Lime.....	Wrightsville, Pa..	91.97	80.00	3.69		.40
1020	Lewis O. Stirn, Woodlawn, Md.	*Ground Limestone.....	Woodlawn.....	34.15	35.00	18.27	15.00	8.10
1000	Thomasville Lime & Stone Co., Thomasville, Pa.	*Ground Limestone.....	Thomasville, Pa	53.54	50.00	1.90		.48
594	Tidewater Portland Cement Co., Union Bridge, Md.	Agr'l Lump Lime.....	Union Bridge..	90.16	90.00	3.77		1.82
577	" " "	Hydrated Lime.....	Mt. Airy.....	70.80	71.50	1.26		2.28
558	W. H. Valliant & Bro., Bellevue, Md.	Oyster Shell Lime.....	Bellevue	52.08	80.00	.30		10.34
597	Chas. Warner Co., Wilmington, Del.	Cedar Hollow Hyd. Lime	Rising Sun....	66.30	.....	9.74		1.76
1016	" " " "	*Pulverized Limestone..	Wilmington, Del...	30.46	29.00	21.43	19.00	4.44
1017	" " " "	Pulv. Burned Lime....	Wilmington, Del...	54.04	56.00	37.61	37.00	3.32
1012	" " " "	Run of Kiln Lime.....	Wilmington, Del...	57.12	57.00	23.49	36.00	1.04

*Ground Shells or Stone Mechanical Analysis on page 8.

TABLE II—SHOWING MECHANICAL ANALYSIS OF GROUND LIMESTONE AND GROUND OYSTER SHELL

For the Chemical Analyses of these samples see preceding table

Figures are percentages or pounds per hundred

"Mesh" indicates the sieve used: "20 Mesh" has 20 wires to the inch.

No.	Name of Manufacturer or Agent	Name of Lime or Kind	Finer than 100 mesh	Bet. 80 and 100 mesh	Bet. 60 and 80 mesh	Bet. 40 and 60 mesh	Bet. 20 and 40 mesh	Coarser than 20 mesh
579	Beaver Dam Marble Co., Cockeystown, Md.	Agricultural Limestone....	13	3	6	15	33	30
1003	H. Bryant's Son, Alexandria, Va.	Ground Oyster Shells.....	34	11	6	12	22	15
583	Chesapeake Shell & Lime Co., Crisfield, Md.	Ground Oyster Shells.....	10	4	4	7	14	61
599	Natural Lime-Marl Co., Roanoke, Va.	Lime-Marl	51	12	9	11	15	2
1002	Palmer Lime & Cement Co., York, Pa.	Ground Limestone.....	69	3	3	5	9	11
1007	Peerless Oyster Co., Balto., Md.	Ground Oyster Shells.....	26	9	6	15	32	12
572	Security Cement & Lime Co., Hagerstown, Md.	Ground Limestone.....	74	5	4	6	9	2
575	Standard Lime & Stone Co., Buckeystown, Md.	Pulverized Limestone.....	35	10	6	17	25	7
1020	Lewis O. Stirn, Woodlawn, Md.	Ground Limestone.....	23	7	4	15	32	19
1000	Thomasville Lime & Stone Co.. Thomasville, Pa.	Ground Limestone.....	100	0	0	0	0	0
1016	Chas. Warner Co., Wilmington, Del.	Pulverized Limestone.....	94	4	2	0	0	0